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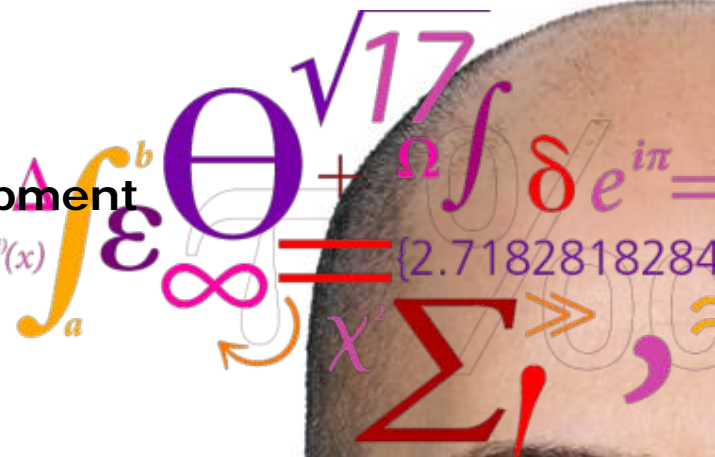
Modern Bioenergy: Potential for Rural Development & Poverty Alleviation in Developing Countries

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(GNESD)

UNEP DTU Partnership, Denmark

$$f(x+\Delta x) = \sum_{i=0}^{\infty} \frac{(\Delta x)^i}{i!} f^{(i)}(x)$$



IRENA Side Event/Conference (Sustainable Bioenergy to Support a Doubling of Renewables)

6th Session of the IRENA Assembly, Abu Dhabi, UAE

20th January, 2016

Outline



UN City, Copenhagen

- Brief introduction of GNESD
- Setting the scene for the bioenergy & rural development discussions
- Modern bioenergy in decentralized systems in rural developing countries: case study on viable options
- Challenges
- Concluding Recommendations

Global Network on Energy for Sustainable Development (GNESD)

Objectives of GNESD:

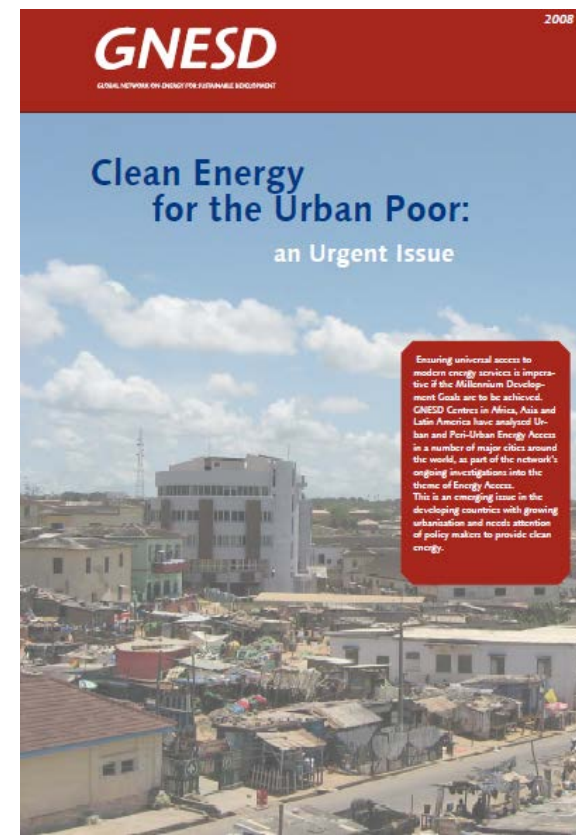
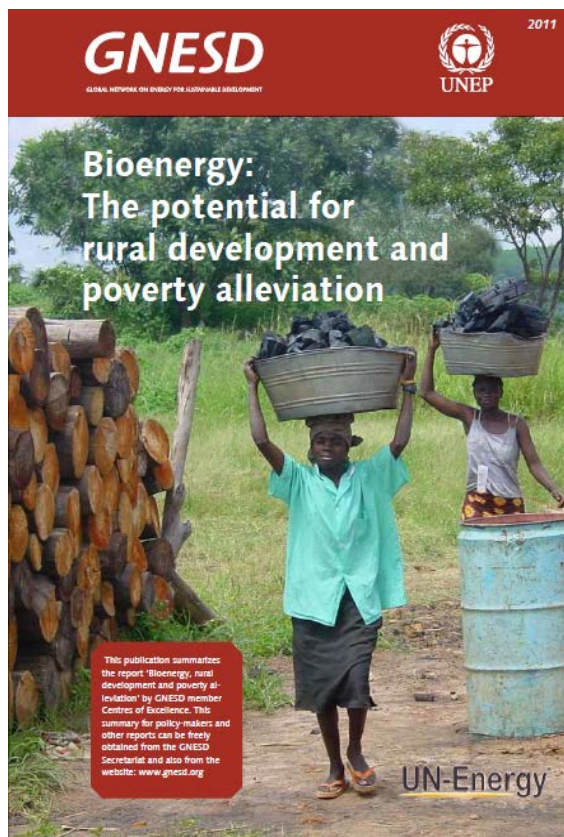
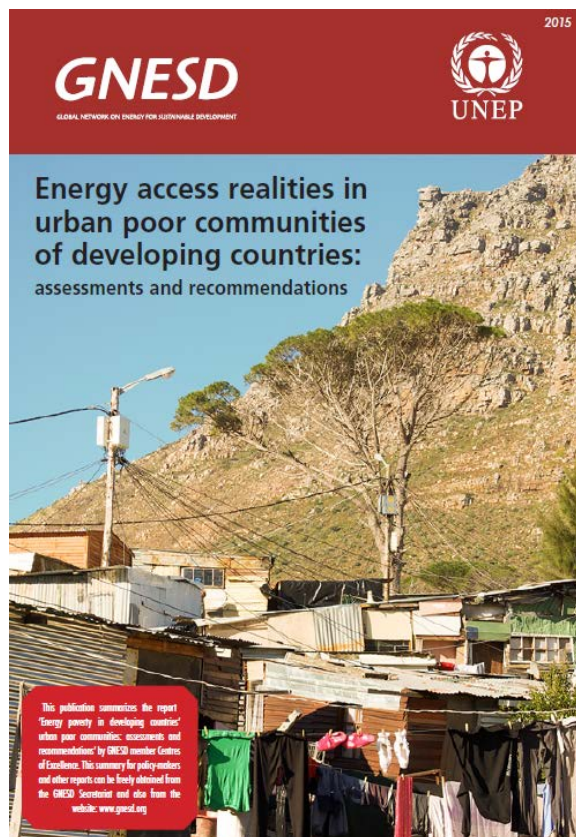
Knowledge network

Policy analysis on environmentally benign **energy systems and **services** that:**

- can help achieve Millennium Development Goals
- are not harmful to human health;
- does not conflict with our food supply;
- result in poverty alleviation and
- achieving sustainable development in member countries



Selected GNESD Publications:



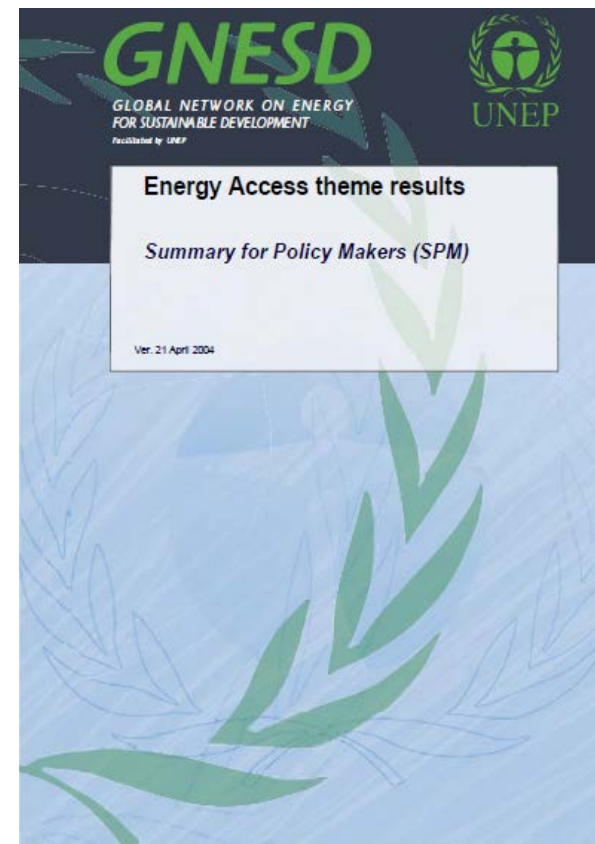
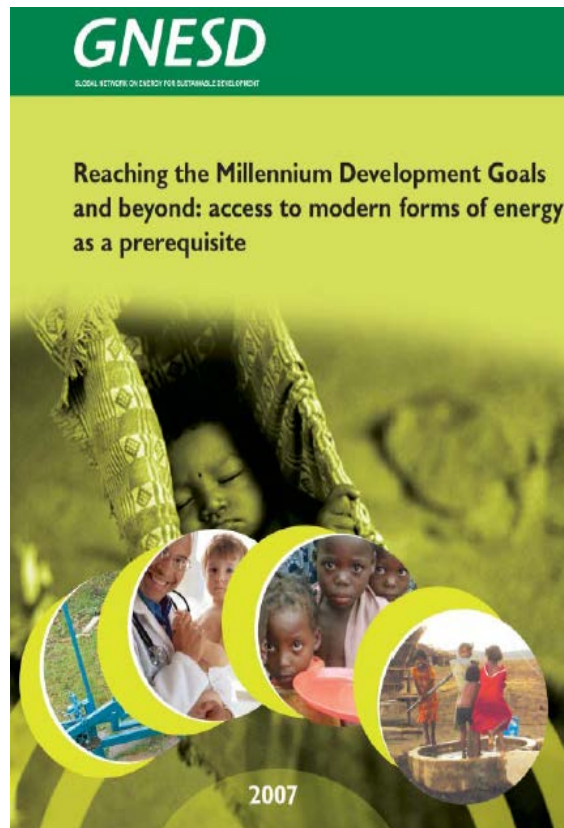
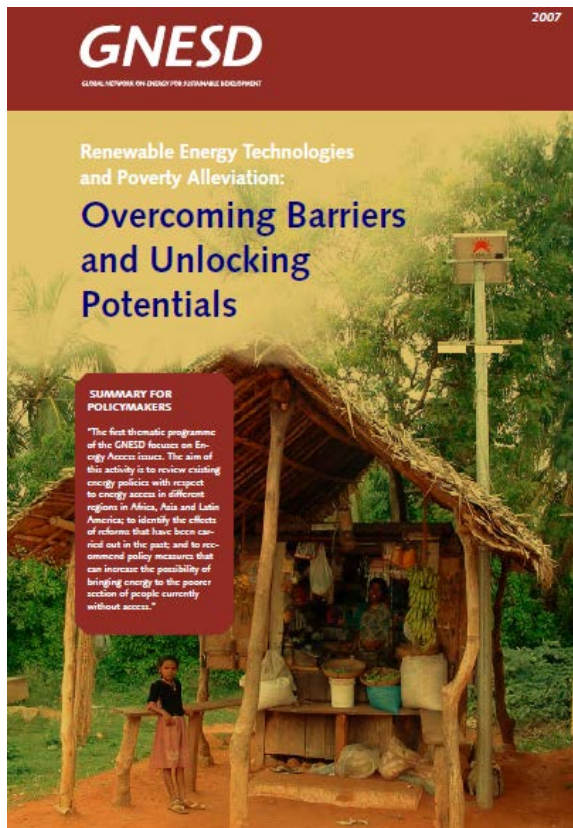
GNESD

GLOBAL NETWORK ON ENERGY FOR SUSTAINABLE DEVELOPMENT

Facilitated by UNEP



Selected Publications: More at www.gnesd.org



COP 16 Side Event, Cancun/Mexico

– Eradicating Energy Poverty Workshop



COP 21 IEA Side Event, Paris/France – Energy Efficient Prosperity

GNESD Invited Talk - IEA Side Event:

- Expanding Energy Access by Scaling-up Energy Efficiency in Sub-Saharan Africa





UN City, Copenhagen

- Brief introduction of GNESD
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Modern Bioenergy vs. Traditional Biomass (examples)



www.midorirenewables.com



www.euei-pdf.org



www.asme.org



www.en.howtopedia.org



Source: www.archive-india.org

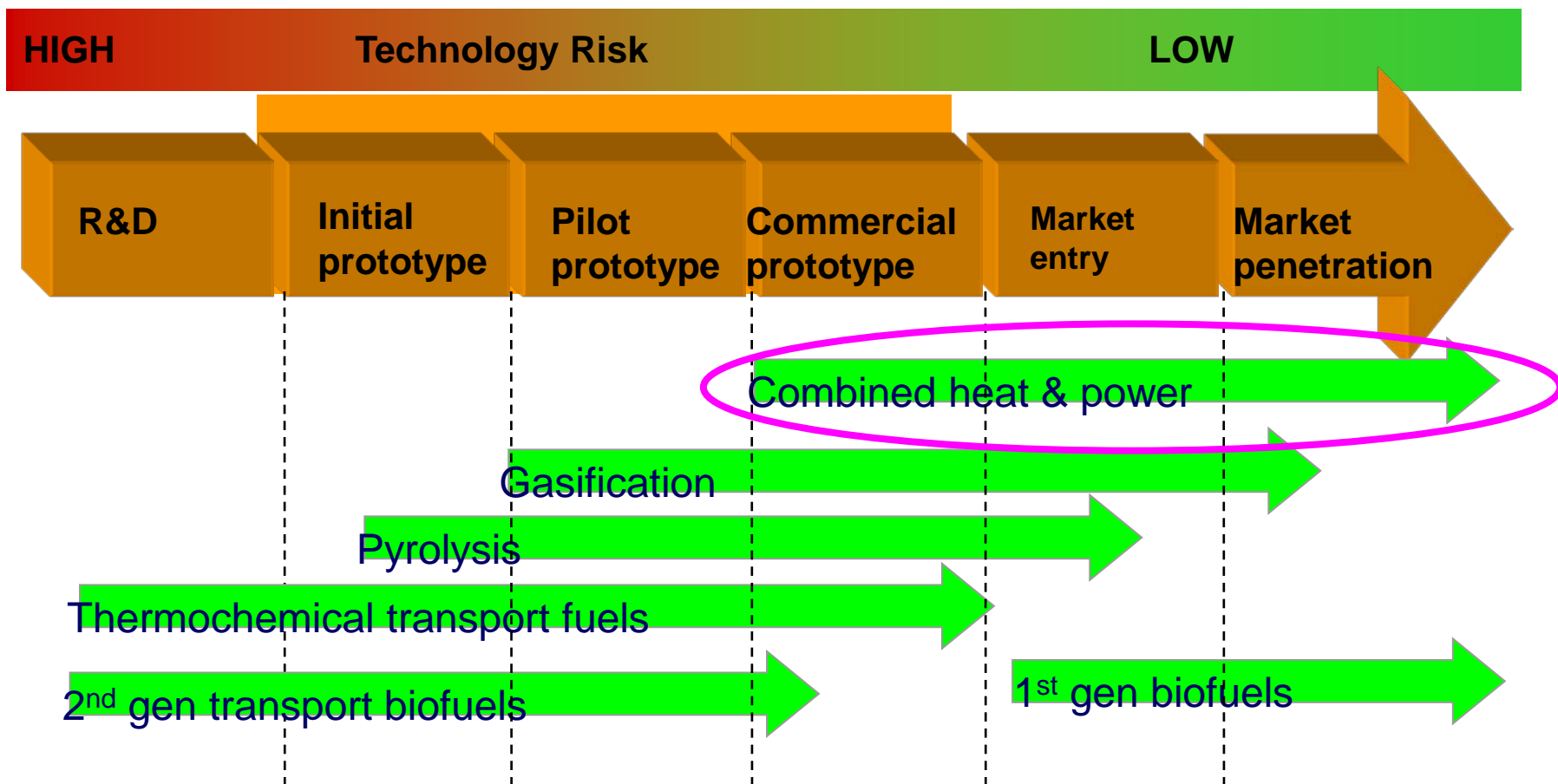
Sustainability considerations on modern bioenergy

- 1st and 2nd Generation bioenergy, advanced biofuels etc
- Bioenergy sustainability debate
 - Net carbon/energy balances
 - Land use change
 - Food vs. fuel
 - Water footprint
 - Biodiversity
 - Labour issues
 - etc
- Use of residues (including agriculture, forestry etc) often reported as preferred option



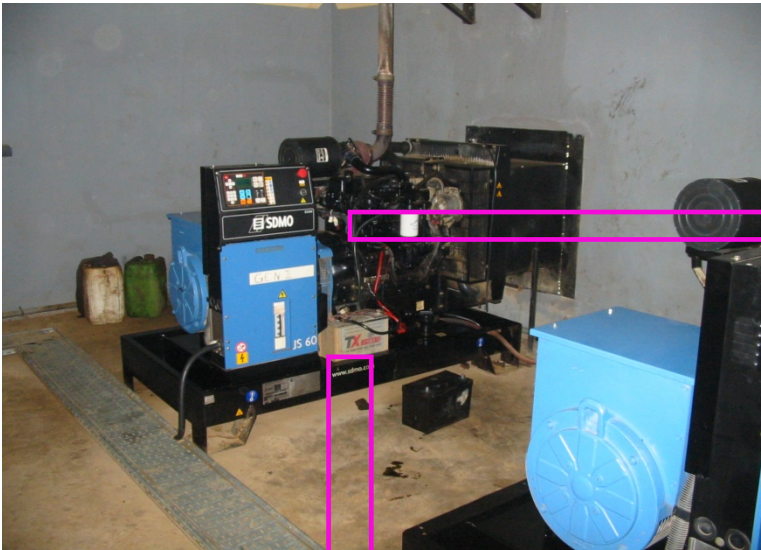
(Source: Greenpeace, 2009)

Bioenergy – which technological option?



(Adapted from Ceres Ventures 2007
by IEA Task 39)

Diesel powered mini-grid, a village in West Africa



**Just when life
starts getting
better**

THEN.....

Making the case for decentralized systems based on local resources – biomass & other RE

- Lack of Infrastructure
- Price volatilities in crude oil
- Remoteness
- Localization of the bioresource
- Cheaper, however storage, logistics etc
- Not so much of a problem



Garalo village electrification, Mali (West Africa)



Garalo village electrification, Mali

- Overall budget 765,000 USD
- The generator used is a hybrid power plant (3 x 100 kW) 5 hrs/daily on diesel and pure Jatropha curcas oil.
- Electricity to 250 subscribers & 42 public street lights
- Productive uses
- Gender (seed production by women)
- Development of local organizational structures & cooperative
- Increased ICT i.e. computers, radios



Biogas: Deqingyuan (DQY) Chicken Farm, Beijing, China



Photo source: Yayuan, 2014

- 3 million chicken produces 210 tonnes of chicken waste/day
- 4 x 3000m³ anerobic fermentation tanks producing 7million m³ of biogas
- Producing 14 million kWh annually and production of heat in the equivalence of 4,500 tonnes of oil.
- By-products includes 150,000tonnes of liquor and 6,600 tonnes of residues annually as organic fertilizer

Malavalli Bio-Power Plant, Mysuru, Karnataka, India

- 4.5 MW
- Developers: Plant Pvt Ltd. and South Pole Ltd., in cooperation with the Swiss-based MyClimate Foundation
- Residues types (agricultural & forestry) via thermal gasification
- Led to several rural entrepreneurial development
- Creation of 650 jobs in residues supply chain, power plant & organic fertiliser production
- Has generated > \$1 million for the community over 7 years

Challenges with modern bioenergy implementation in rural settings

- Lack of adequate technical know-how at the village level for operation, maintenance and repairs
- Cross-sectoral nature of modern bioenergy and associated institutional challenges among various sectors i.e. agriculture, energy, water, environment, waste, industry etc.
- Economic cost in collecting feedstock materials over large areas
- Initial capital cost



Conclusion

- Bioelectricity from residues exhibit good poverty alleviation potential
- The knowledge from the case examples could help inform decision on how bioelectricity from biomass can be utilized to bring about real development (economic, social and environmentally benign development).
- Extending electricity access should not only be about long transmission lines but decentralized systems could play key roles especially in rural settings of developing countries
- Further work is required especially to study the mechanisms employed that led to the success in the case examples. This would help ensure success of future activities and promote wider uptake in modern bioenergy especially in remote communities (possibly in hybrid system)

Thank you

Global Network on Energy for Sustainable Development (GNESD)

UNEP DTU Partnership / Technical University Denmark

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